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QUALITY IMPROVEMENT REPORT

The Pathfields Tool: a frailty case-finding tool using primary care IT—implications for population health management

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Abstract

Background: older people living with frailty benefit from targeted interventions which improve health and independence. However, it has been challenging within primary care to systematically identify patients living with frailty.
Study aims:

1. To develop and operationalise a frailty case-finding tool (called the Pathfields Tool) in primary care, using primary care IT, that could systematically identify a high-risk population cohort for opportunistic individual validation by a clinician
2. To compare the accuracy of the revised tool with the Electronic Frailty Index (eFI)

Methods: primary care IT was re-programmed to create a 'Pathfields High Risk Cohort' (PHRC, patients felt likely to have undiagnosed frailty) and invite clinicians to opportunistically assess and diagnose frailty. Results were compared with NHS England's current approach to frailty identification using Electronic Frailty Index (eFI) to see which approach had the highest diagnostic yield.
Results: the Pathfields Tool identified 1,348 patients in PHRC group, of whom 951 (70.5%) were clinically assessed and diagnosed:

- 24.1% not frail
- 75.9% with frailty (27.3% mild; 29.9% moderate; 18.7% severe)

eFI (moderate and severe) identified 683 patients of whom 598 (87.6%) were clinically assessed and diagnosed:

- 52.7% not frail
- 47.3% with frailty (19.1% mild; 17.19% moderate; 11.2% severe)

Extrapolated data would estimate frailty prevalence at 22.5% (1,024/4,552) (5.5% severe, 8.8% moderate, and 8.1% mild) in the practice population aged 65+.
Conclusions: the Pathfields Tool identified more patients with clinically confirmed previously undiagnosed frailty than eFI 'moderate and severe frailty' alone. Sub-segmenting frailty by residential status could significantly improve the population health management of older people.

Keywords: frailty, screening, case-finding, identification, primary care, quality improvement

Key points

- The Pathfields Tool: a frailty case-finding tool supporting primary care clinicians to identify older people with frailty.
- Clinician feedback on the Pathfields Tool demonstrated it was easy to implement and identify frailty.
- The Pathfields Tool can support evidence-based commissioning by guiding the location and design of services.
- The Pathfields Tool appears to be superior at identification of frailty compared to current tools in primary care.

Introduction

Frailty is defined as state of reduced physiological reserve where seemingly trivial physiological stressors trigger a dramatic deterioration in function [1].

Interventions targeting this cohort of patients have the potential to achieve the triple win of improving quality of care, improving health and reducing service demand and cost [1]. However, it has been challenging within primary care to systematically identify patients living with frailty who may benefit.

In 2017 the NHS England (NHSE) recommended that primary care uses the lectronic Frailty Index (eFI) to segment the population and case-find individuals living with moderate and severe frailty [2,3]. eFI analyses the primary care records looking at 36 parameters or 'deficits', based on approximately 2,000 read codes [3]. The deficits are summed and then decimalised. If patients have 9–12 deficits (0.24–0.36), they are said to have 'eFI moderate frailty'. Thirteen deficits or more (>0.36) categorise them as 'eFI severe frailty'. It should be emphasised that the terms 'moderate' or 'severe' frailty in this context are categorisations according to eFI rather than diagnoses of frailty, and a clinician review and confirmation of diagnosis (if appropriate) should follow. At the time the NHSE advocated using patient in the 'eFI moderate and severe frailty' category only.

However, there are limitations. Some patients with few eFI-defined deficits may have severe frailty, resulting in the risk of false negatives. Variation in clinical coding may also have an impact.

Other screening tools for frailty are available such as the Timed Up and Go Test (TUGT), PRISMA 7 and Gait Speed Test [4] but are less frequently used as they require additional primary care resources.

Within the constraints of primary care, the Rockwood Clinical Frailty Scale [5] may be useful as clinicians can use this tool and combine it with their knowledge of the patient to diagnose frailty opportunistically. This would need to be systematised.

The aims of this study were as follows:

1. Develop and operationalise a case-finding tool (called the Pathfields Frailty Case-finding Tool or 'Pathfields Tool' for short) in primary care, using primary care IT, that systematically identifies a high-risk population cohort for opportunistic individual validation by a clinician, based on knowledge of the patient and the Rockwood Clinical Frailty Scale.
2. Compare the Pathfields Tool with the Electronic Frailty Index (eFI) 'moderate and severe frailty category'.
3. Ascertain whether sub-segmenting frailty by residential status (own home, supported living, care homes) might guide the location and development of services (evidence-based commissioning).

This was piloted at Pathfields Medical Group, a primary care network in Plymouth, Devon.

Method

The Pathfields Tool was created on a primary care IT (SystmOne) and had three key elements:

1. The 'Pathfields High Risk Cohort' or PHRC: this was a patient population who were considered to be at high risk of having undiagnosed frailty. Searches were run on primary care IT to create the following patient groups (rationale in brackets):

a) Age 90+ years of age (25–60% frailty prevalence in previous studies [6,7])
b) Dementia diagnosis (strong coexistence of frailty with dementia [1])
c) eFI severe frailty (moderate category omitted as anecdotally there appeared to be many false positives in this group)
d) Noted to have difficulty mobilising in their annual review (see below)
e) Patients in a care home (likely to have coexisting frailty)
f) Patients home visited in the last year (previous study has shown good sensitivity and specificity [8])

The PHRC list was programmed to update daily so that new patients could be added.

2. Software programming to diagnose patients in the 'difficulty mobilising' patient group: a 'difficulty mobilising' patient group was created to mitigate against underdiagnosis of mild frailty (patients with mild frailty would generally be able to get into surgery for their annual reviews and may not be in the above groups). Primary care IT was programmed to generate a screen message when any 65+-year-old patient attended a nurse or healthcare assistant (HCA) appointment. The screen message asked: 'Compared to a fit and well person of a similar age, is this patient *obviously* slower with walking or struggling to stand?'. If the HCA/nurse clicked yes, the patient was read coded as 'difficulty mobilising' and automatically entered into the PHRC. This modification of the gait speed and TUGT enabled a quicker, subjective evaluation that was time neutral to primary care.

3. Software programming to enable opportunistic diagnosis of frailty and residential status

   The system was programmed so that if a patient who was at high risk of having undiagnosed frailty (i.e. on the PHRC list) consulted a clinician for any reason, a screen message would appear asking the clinician to:

   (a) Diagnose frailty by severity (mild, moderate, severe). This was achieved by using the Rockwood Clinical Frailty Scale [5], to frame the assessment and supplemented by the primary care clinician's longitudinal knowledge of the patient and their functional status.
   (b) Identify whether the patient was housebound or in a care home.

At the end of the 9 months, a separate list of patients with an eFI score of 'moderate and severe frailty' was also created (many of these patients had already been opportunistically assessed for frailty as they were in the PHRC list). This is the list that most GP surgeries are using to case-find frailty. The eFI patient list was compared against the PHRC list to see which had a higher detection rate and diagnostic accuracy according to final clinical assessment. Patients who had died during the 9-month period were excluded from analysis. The pilot ran from 11 February to 5 November 2019.

Results

There were 4,552 older people (65+ years of age) in Pathfields Medical Group, of which 1,348 were on the PHRC list (i.e. at high risk of having undiagnosed frailty). A flow diagram outlining the patient numbers and process is illustrated in Figure 1.

The accuracy of the Pathfields Tool and eFI for case-finding and diagnosis of frailty by severity is shown in Table 1.

The Pathfields Tool identified 722 older people who were subsequently confirmed by a clinician as having a diagnosis of frailty. During the 9-month period, no additional older people were diagnosed with frailty who were not flagged up by the Pathfields Tool. After clinical confirmation, the eFI list identified 283 out of the 722 (39.2%) patients with frailty (false negatives $n = 469$; 60.8%) with the following breakdown by severity:

- Mild frailty: 114 out of 260 (43.8%) patients identified (false negatives $n = 146$; 56.2%)
- Moderate frailty: 102 out of 284 (35.9%) patients identified (false negatives $n = 182$; 64.1%)
- Severe frailty: 67 out of 178 (37.6%) patients identified (false negatives $n = 111$; 62.4%)

Categorisation of patients by final clinician-confirmed frailty severity and residential status is shown in Table 2.

Current frailty prevalence in those assessed aged 65+ using the Pathfields Tools and eFI is 15.9% ($n = 951$) and 6.2% ($n = 598$), respectively. However, not all patients in these groups were assessed during the timescale of the pilot. Assuming the diagnostic yield and distribution of frailty severity in the patients who have not yet had a frailty assessment remains unchanged, frailty prevalence in the 65+-year-old practice population ($n = 4,552$) using the Pathfields Tool is estimated to be 22.5% (n = 1,024) of which:

- Mild frailty 8.1% ($n = 369$)
- Moderate frailty 8.8% ($n = 403$)
- Severe frailty 5.5% ($n = 252$)

Frailty prevalence in the eFI group is estimated at 7.1% ($n = 323$) of which:

- Mild frailty 2.9% ($n = 130$)
- Moderate frailty 2.6% ($n = 116$)
- Severe frailty 1.7% ($n = 77$)

Discussion

When the Pathfields Tool is compared with 'eFI moderate and severe', the number of patients identified and diagnostic rate is higher. 1,348 patients at high risk of having frailty were identified using the Pathfields Tool, of which 75.9% ($n = 722$) patients ended up with a diagnosis of frailty. Using 'eFI moderate and severe' alone identified 683 patients at high risk of having undiagnosed frailty, of whom 47.3% ($n = 283$) received a diagnosis of frailty of any severity.

The Pathfields Tool was relatively straightforward to design, requiring six sessions of GP time. This pilot study used SystmOne, and similar methodology has been used to programme EMIS Web. A similar amount of sessional time would likely be needed on other primary care IT systems to set it up and test it thoroughly.

Opportunistic frailty case finding was comparatively rapid, with 70.5% of patients assessed and diagnosed by 9 months.

Clinician feedback with regard to usability was extremely positive. The screen message with pictorial Rockwood Clinical Frailty Scale and single-button click greatly assisted with categorising clinically confirmed frailty. Importantly it was felt that opportunistic case finding did not have an impact on overall workload as all it required was two clicks of a mouse button.

However, whilst Pathfields clinicians received training in recognition and diagnosis of frailty, locum GPs and some non-medical prescribers did not. This might result in misdiagnosis of frailty severity in some patients. However, the authors feel that the correlation between frailty severity and residential status supports a robust level of accuracy. Patients with mild frailty were largely not housebound (70%), whereas patients with moderate frailty and severe frailty were most commonly housebound (45.8%) or in care homes (68%), respectively. This correlated well with the descriptors in the Rockwood scoring system for mild, moderate, and severe frailty. If this was to be implemented elsewhere, we would suggest that all clinicians (GPs, advanced nurse practitioners, paramedics if they do home visits) receive training in frailty recognition, classification and diagnosis.

Table 1.

	Pathfields High Risk Cohort (patients at high risk of having undiagnosed frailty. NOTE also uses eFI severe) (n = 1,348)						eFI (n = 683)		
	Difficulty mobilising (n = 603)	Age > 90 (n = 285)	Dementia diagnosis (n = 220)	Home visit (n = 678)	Care home (n = 264)	Pathfields High Risk Cohort (n = 1,348)	eFI Moderate (n = 577)	eFI Severe (n = 106)	eFI combined (n = 683)
Patients assessed	**260**	**248**	**205**	**625**	**255**	**951**	**496**	**102**	**598**
	43.1%	**87.0%**	**93.2%**	**92.2%**	**96.6%**	**70.5%**	**86.0%**	**96.2%**	**87.6%**
Patients not assessed	343	37	15	53	9	397	81	4	85
	56.9%	13.0%	6.8%	7.8%	3.4%	29.5%	14.0%	3.8%	12.4%
Patients not frail	105	37	12	81	12	229	298	17	315
	40.4%	14.9%	5.9%	13%	4.7%	24.1%	60.1%	16.7%	52.7%
Of those assessed, total patients with frailty	**155**	**211**	**193**	**544**	**243**	**722**	**198**	**85**	**283**
	59.6%	**85.1%**	**94.1%**	**87.0%**	**95.3%**	**75.9%**	**39.9%**	**83.3%**	**47.3%**
Mild frailty	104	59	26	140	21	260	86	28	114
	40.0%	23.8%	12.7%	22.4%	8.2%	27.3%	17.3%	27.5%	19.1%
Moderate frailty	41	85	81	237	92	284	68	34	102
	15.8%	34.3%	39.5%	37.9%	36.1%	29.9%	13.7%	33.3%	17.1%
Severe frailty	10	67	86	167	130	178	44	23	67
	3.8%	27.0%	42.0%	26.7%	51.0%	18.7%	8.9%	22.5%	11.2%
Residential status (if diagnosed with frailty)	155	211	193	544	243	722	198	85	283
• Not housebound	113	49	33	115	4	246	73	29	102
	72.9%	23.2%	17.1%	21.1%	1.6%	34.1%	36.9%	34.1%	36%
• Housebound	33	66	42	209	22	232	67	29	96
	21.3%	31.3%	21.8%	38.4%	9.1%	32.1%	33.8%	34.1%	33.9%
• Supported living	7	5	3	19	4	23	8	1	9
	4.5%	2.4%	1.6%	3.5%	1.6%	3.2%	4%	1.2%	3.2%
• Care home	2	88	112	195	206	213	48	25	73
	1.3%	41.7%	58%	35.8%	84.8%	29.5%	24.2%	29.4%	25.8%
• Unknown	0	3	3	6	7	8	2	1	3
	0%	1.4%	1.6%	1.1%	2.9%	1.1%	1%	1.2%	1.1%

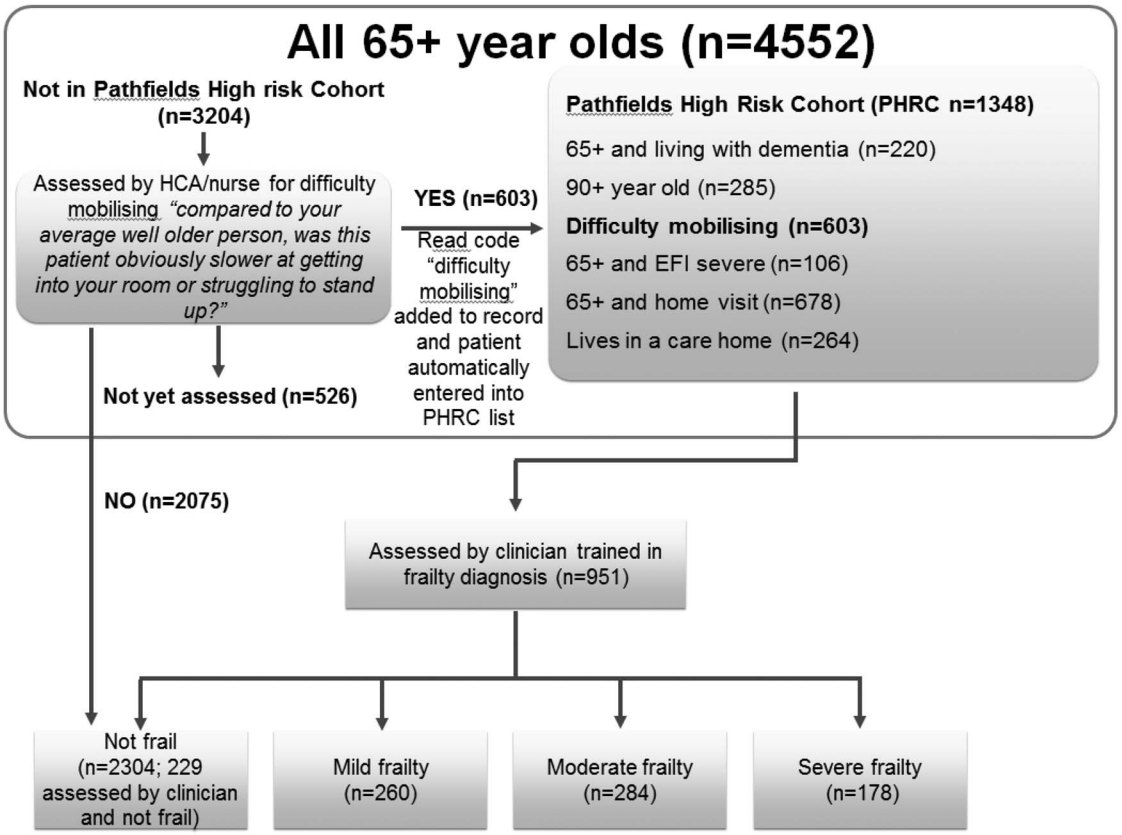

Figure 1. Patient flow diagram using Pathfields High Risk Cohort.

Table 2. Frailty severity and residential status

Level of frailty	Not housebound (%)	Housebound (%)	Supported living (%)	Care home (%)	Unknown (%)
Mild frailty ($n = 260$)	182 (70.0)	55 (21.2)	9 (3.4)	12 (4.6)	2 (0.7)
Moderate frailty ($n = 284$)	59 (20.8)	130 (45.8)	9 (3.2)	80 (28.2)	6 (2.1)
Severe frailty ($n = 178$)	5 (2.8)	47 (26.4)	5 (2.8)	121 (68.0)	0 (0)

In some patients, residential status was unknown. This was because the screen message that asked clinicians to code a patient's residential status was introduced a few weeks after the frailty assessment screen message.

There was confounding in that one of the practice's largest supported households was next door to one of the six GP surgeries. As a result some patients who would have been classified as housebound for the purposes of community medical care (e.g. district nursing) were in the slightly unusual situation of being able to get to the surgery due to proximity. Although this caused clinicians some confusion, the group were generally classified as 'housebound in supported living'.

Although there were 1,348 patients eligible for frailty assessment in the Pathfields Tool, one patient might have appeared in two or more different patient groups. For example, patients in care homes were generally also home-visited.

A potential weakness of this project is that eFI 'moderate' was not assessed at the outset. Instead, at 9 months, patients with eFI 'moderate' were analysed to assess the diagnostic rate in this group and offer a comparison with the Pathfields Tool. Despite this, 86% of patients in eFI 'moderate' did have a frailty assessment, leading to 39.9% of patients having a confirmed diagnosis of frailty. Of all the patient groups, eFI 'moderate' had the lowest diagnostic rate.

At 9 months, mild frailty was felt to be under-represented. This was because it was a two-step process, requiring a HCA/nurse to screen 3,807 65+ year olds for difficulty walking and then a clinician to diagnose frailty opportunistically when the patient next presented. As expected the 'difficulty mobilising' group had the highest mild frailty diagnosis rate in all the patient groups in the Pathfields Tool. A future study could compare this method of case-finding mild frailty, with eFI mild frailty (the latter was not employed).

According to eFI, the practice has an estimated frailty prevalence of 7.1% in older people (65+ years of age), with a moderate and severe frailty prevalence of 4.2%. This is lower than NHS Digital which estimates moderate and severe frailty prevalence at 9% [9]. There may be several reasons for

this; a few years ago, Pathfields Medical Group migrated to a new primary care IT system (called SystmOne), and there may have been some changes in read coding or under-usage of read codes used by eFI. Furthermore there is growing circumstantial evidence that some GP practices may have batch-coded a read code diagnosis of frailty based solely on an eFI score, without clinical judgement confirming a diagnosis [10]. This could skew NHS England's prevalence data. At an individual level, it could result in inappropriate interventions and follow-up.

The Pathfields Tool estimates frailty prevalence to be in the region of 22.5% in older people, roughly in line with prevalence studies [6]. There will clearly be geographic variations in frailty prevalence (Plymouth has high levels of deprivation), and it is hoped that other primary care networks in Devon will be supported to undertake a similar process so that frailty identification and true prevalence data in the region can be ascertained.

There are also implications for population health management of older people. Segmenting a population by frailty severity is accepted. Sub-segmenting this population by residential status is a novel approach and could be useful for guiding evidence-based commissioning.

For example, if all primary care networks (PCNs) in an area were to use the Pathfields Tool, heat maps could be generated of mild, moderate and severe frailty, broken down by residential status. A high concentration of mild frailty in a location might persuade commissioners or providers to target evidence-based interventions for this population segment.

Lastly the increased identification of frailty will provide patient benefit. More patients can be offered evidence-based interventions such as falls classes and comprehensive geriatric assessment [1]. This, combined with good preventative care, will offer population benefit at scale.

Conclusion

The Pathfields Tool is simpler and quicker for clinicians to use, identifies more patients living with frailty than eFI alone and offers the capability to sub-segment a population by frailty and residential status. As well as offering more patients access to evidence based interventions, it offers up the prospect of enabling evidence-based commissioning using a population health management strategy that embraces all older population segments.

To develop this study further, the authors would suggest a cluster randomised control trial for frailty and comparing 'eFI mild, moderate, and severe frailty' with the Pathfields Tool to determine sensitivity, specificity and positive and negative predictive values.

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Declaration of Conflicts of Interest: The IT software that enabled this case-finding tool to be developed was originally designed in on primary care IT in Pathfields Medical Group. In January this year (after submission for publication), many practices in the Plymouth locality expressed a strong desire to use the Pathfields Tool so that they could improve the care of older people. To mitigate against any liability for the Pathfields partnership and to allow sharing of this software with other practices, this tool was relocated to a community interest company called Sentinel. The long-term ambition is to develop a private company that develops IT templates for primary care. Ultimately, this IT software will be housed in this private company but will remain free and available for all healthcare professionals to use, indefinitely.

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